

Project ISTC - K-1240p

“Post-containment Management and Monitoring of Mercury
Pollution in Site of Former PO “Khimprom” and Assessment
of Environmental Risk Posed by Contamination of
Groundwater and Adjacent Water Bodies of the Northern
Industrial Area of Pavlodar”

Quarterly technical report

on the work performed from 1 October 2006 - to 31 December 2006

Quarter 5

Non-profit JSC “Almaty Institute of Power Engineering and
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Signature / Date

1. Summary of Technical Progress

1.1. Current Technical Status

Task Subtask	Start (quarter)	End (quarter)	Status / Comments
1.1.	1	4	It is not completed due to PCP bankruptcy
1.2.	4	8	Implementing /At the stage of discussion
1.3.	1	12	Implementing / data processing of 1 monitoring year
2.1.	1	2	Completed
2.2.	3	4	Completed
2.3.	5	6	Implementing / “incut” model is at the stage of calibration.
2.4.	7	12	
2.5.	10	12	
2.6.	8	8	
2.7.	8	8	
2.8.	9	10	
2.9.	9	10	
3.1.	1	2	It is not completed because bankruptcy of PCP partner
3.2.	4	6	Lack of progress due to bankruptcy PCP partner and reorganization of BMP partner
3.3.	8	8	
3.4.	8	8	
3.5.	9	11	
3.6.	11	12	
4.1.	1	2	Completed
4.2.	2	10	It is a break in the 5 quarter at the work /Sampled and analyzed 1/3 of necessary samples.
4.3.	3	11	Implementing /Map of Initial pollution created
4.4.	4	8	Break at the work in 5 quarter/Sampling methodology worked out; 60 samples of fish were sampled.
4.5.	4	9	Implementing /Chemical-analytical work is conducting
4.6.	10	12	
5.1.	1	12	Implementing
5.2.	1	12	Implementing

1.2. Tasks of the work plan

Task 1: Study of the movement of mercury in the groundwater rise in depressed area in saturated and unsaturated zones and its accumulation in the shallow ponds and vegetation. Development of management strategy to contain the risk to population in the vicinity and livestock

Subtask 1.1: To revise the Program of Post-containment Monitoring by expanding the study of pollution of groundwater and biota, and by adding the tests of grazing grass and milk.

- **State / Situation at the beginning of the current quarter**

During summer and autumn (2006) field studies it became obvious the necessity to correct the Work Plan by means of expansion of mercury monitoring and including there an investigation of atmosphere pollution with mercury vapors, soils – with total mercury, groundwater and surface water – with methyl mercury.

- **Fulfilled work**

Processing of the field studies data has been implemented and the data of chemical and analytical works has been obtained, which have proved the necessity to enlarge the scope of mercury monitoring.

- **Results by the end of the current quarter**

The program of the correction of the monitoring working plan has been prepared lying mainly in expansion of tasks on mercury monitoring due to contraction of tasks on oil products monitoring (it is included in the First Annual Report). These suggestions have been discussed now. The correction of the Work Plan is supposed to be done in 6th quarter of the project.

Subtask 1.3: To carry out 3-year monitoring program (sampling and analysis), including the monitoring of soils, surface and ground water, aquatic biota, milk, and grazing grass in the close vicinity of groundwater contamination. To measure the hydrogeological parameters (water levels in boreholes, pH, temperature, redox potential) simultaneously with groundwater sampling.

- **State / Situation at the beginning of the current quarter**

During summer and autumn (2006) field studies the data on mercury content in groundwater and the near-earth atmosphere has been collected and soil samples have been taken.

- **Fulfilled work**

Data on groundwater samples chemical analysis for methyl mercury have been obtained, chemical and analytical works with soil samples have been carried out and processing of data of field studies have been conducted.

- **Results by the end of the current quarter**

The results obtained say for substantial decrease in total mercury concentration in groundwater in the vicinity of the isolated mercury hot spots. Such decrease can result from two reasons (i) efficient containment of mercury hot spots by clay cut-off walls, (ii) significant water losses from underground water supply system of PCP at the area of the mercury contamination resulting in dilution of mercury containing groundwater.

At the same time the results obtained on mercury content in soil and near-earth atmosphere suggest both insufficiency of measures undertaken on the soil clean-up at the territory of former chlor-alkali production and persistence of high risk of groundwater mercury pollution as a result of infiltration of water from melted snow and atmospheric precipitation and also high risk for PCP's employees.

Methyl mercury occurs in groundwater in quite low but noticeable quantities. It is an evidence of taking place unknown chemical and/or microbiological processes in the area of contamination leading to generation of more toxic and dangerous mercury forms in groundwater.

Task 2: Assessment of possibility for mercury-polluted groundwater flow to change its direction; study of interaction of contaminated groundwater with bearing strata and underlying aquifers
Subtask 2.3: To create the detailed "incut" model for the area of Hg contaminated groundwater.

- **State / Situation at the beginning of the current quarter**

Inverse stationary task has been solved. Position of groundwater level as of 1970 has been represented at the model.

- **Fulfilled work**

Inverse non stationary task is being solved. Change of hydro-geological conditions from 1970 to 2001 is being produced at the model. Coefficients of both elastic and gravitational water loss of water bearing strata have been selected; groundwater recharge due to process water losses from engineering services are being defined more precisely.

- **Results by the end of the current quarter**

Draft of a manuscript on the results of simulation of groundwater mercury contamination has been prepared (in Russian) for publication in a scientific journal. At present it is being translated to English.

Task 4: Assessment of possibility to contain the risk posed by mercury pollution of lake Balkyldak including the fish within it

Subtask 4.3: To create and analyze the map of Hg contamination of bottom sediments using the software package “ArcGIS – Spatial Analysis”.

- **State / Situation at the beginning of the current quarter**

Data (sampling points coordinates, sampling depths, bottom sediments thickness and total mercury contents in bottom sediment samples) have been obtained for 69 bottom sediment sampling points within wastewater storage pond Balkyldak (approximately one third of scheduled works).

- **Fulfilled work**

Preliminary vector map of wastewater storage pond Balkyldak depths, thickness of its bottom sediments and their mercury contamination has been produced in the framework of GIS of the wastewater storage pond Balkyldak using Spatial Analyst, ArcGIS software as well as provisional calculation of amount of mercury deposited in bottom sediments of the pond has been made.

- **Results by the end of the current quarter**

Preliminary vector map of the wastewater storage pond Balkyldak depths, thickness of its bottom sediments and their mercury contamination has shown localization of mercury containing sediments in three the deepest depressions of the pond that is mainly caused by waving activity. Provisional value of amount of mercury deposited in the bottom sediments of the wastewater storage pond Balkyldak has come to 135.0 tons.

Subtask 4.5: To conduct chemical analysis (including the determination of total mercury content) and morphological studies of the taken samples of biota.

- **State / Situation at the beginning of the current quarter**

In 2006 140 samples of the wastewater storage pond Balkyldak bottom sediments have been taken from 69 sampling points. Samples of aquatic life of the pond Balkyldak including 60 samples of fish have been taken.

- **Fulfilled work**

Chemical and analytical works have been carried out to determine total mercury contents in the bottom sediments samples.

Morphological analysis of 60 samples of silver crucian carp has been conducted.

- **Results by the end of the current quarter**

Data on total mercury content in the bottom sediment samples have been obtained and “Summary table 08.2006” has been compiled for producing a vector map of the wastewater storage pond Balkyldak mercury contamination.

Morphological analysis conducted on 14 characteristics of silver crucian carp inhabiting the pond Balkyldak (30 samples) and a control pond (30 samples) has shown significant difference on 6 characteristics.

Task 5: To draw up and discuss with local stakeholders the recommendations for the 2nd stage of

demercurization and other remediation activities in the area of the former PO “Khimprom” (Northern industrial area of Pavlodar), including the recommendation for abolishment or further safe use of the wastewater storage pond – lake Balkyldak

Subtask 5.1: To discuss the work program and obtained results with Pavlodar regional department of environmental protection and with the managers of Pavlodar Chemical Plant.

▪ **State / Situation at the beginning of the current quarter**

The results of mercury monitoring conducted in the framework of k-1240p project in 2006 were discussed regularly with managers of Pavlodar Territorial Environmental Protection Authority, Environmental Department of Pavlodar oblast Akimat and administrations of PCP and JSC “Kaustik” as well as Office of Public Prosecutor of Pavlodar oblast.

▪ **Fulfilled work**

Public Hearings on the results of investigation of the wastewater storage pond Balkyldak was conducted on the 22 of December, 2006 in Pavlodar together with Environmental Department of Pavlodar oblast Akimat (deputies of oblast Maslikhat, clerks of environmental and sanitary and epidemiological departments, PCP administration participated). The Public Hearing was highlighted on in news programs of two Pavlodar oblast TV channels (Kazakhstan-Pavlodar, Irbis).

▪ **Results by the end of the current quarter**

Data of 2006 on total mercury content in the wastewater storage pond Balkyldak bottom sediments were discussed at the Public Hearings, which showed seriousness of potential risks posed by this technical water body. “Science based recommendations on arrangement of the wastewater storage pond Balkyldak monitoring” and “Program of research of the wastewater storage pond Balkyldak” were approved. Also possibilities of radical change of ichthyocenosis structure of the wastewater storage pond Balkyldak were discussed.

Subtask 5.2: To hold the workshops, press-conferences and presentation in order to discuss the interim results.

▪ **State / Situation at the beginning of the current quarter**

In 2006 the results of mercury monitoring conducted in the framework of K-1240p project were discussed several times in mass media and with the public of Pavlodar City.

▪ **Fulfilled work**

30.11.06 - 2.12.06 teachers and students of PSU held the presentation “Our choice – clean water body” in the secondary school N 40 in Pavlodarskoe village where the results of study of the wastewater storage pond Balkyldak mercury contamination and risks came from it were presented. The purpose of the presentation was to attract attention of the growing up generation to the problems related to an environmental protection in particular the mercury contamination in the northern outskirts of Pavlodar.

▪ **Results by the end of the current quarter**

The presentation has been held, which clarified a danger of eating fish caught out of the wastewater storage pond Balkyldak and pasturing livestock in the vicinity of PCP to the inhabitants of Pavlodarskoe village.

The article “Myths and truth about mercury” has been published in Pavlodar newspaper “Novoe vremya” (N 50 of 21.12.06.) on the results of participation of Pavlodar scientists at the 8th International Conference “Mercury as a Global Pollutant” (Madison, Wisconsin, USA, the 6-11th August of 2006).

Task 0.: Project Management**▪ Fulfilled work**

First Annual Report has been prepared and discussed. Also replacement of the partner PCP by the partner JSC ‘Kaustik’ has been done. Possibilities of Work Plan as well as the budget of K-1240p project correction in 6th quarter have been discussed.

4. Significant Travel and Meetings**4.1. Travel and meetings inside CIS**

1. Almaty-Pavlodar-Almaty
5 days
Ilyushchenko Mikhail Alexeevich
In Pavlodar public hearing were conducted based on results of research of storage pond – lake Balkyldak.
“Science based recommendation on organization of monitoring of wastewater storage pond – lake Balkyldak” and “Programme of scientific research of wastewater storage pond – lake Balkyldak were agreed. Possibilities of radical changes of ichthyology cenosis structure of storage pond were discussed also.

4.2. Travel and meetings outside CIS

1. no

5. Co-operation with foreign collaborators

- Exchange of scientific material (information, computer codes and data, samples)

First yearly report and suggestion on correction of Work Plan and project budget of the 6 quarter were discussed with coordinator Trevor Tanton and partner Paul Randall.